

## EAST Search History

| Ref # | Hits | Search Query   | DBs                                       | Default Operator | Plurals | Time Stamp       |
|-------|------|--|---|------------------|---------|------------------|
| L1    | 0    | ((board near roughness) with \$1mu\$1m).ab.  | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR               | ON      | 2007/09/21 16:11 |
| L2    | 0    | ((board near roughness) with \$1mu\$1m).ab.  | US-PGPUB;<br>USPAT;<br>USOCR              | OR               | ON      | 2007/09/21 16:11 |
| L3    | 1    | ((board near2 roughness) with \$1mu\$1m).ab.   | US-PGPUB;<br>USPAT;<br>USOCR              | OR               | ON      | 2007/09/21 16:11 |
| S1    | 72   | roughness and (conductive near elastomer\$3)   | USPAT                                     | OR               | OFF     | 2007/09/21 14:45 |
| S2    | 9    | roughness same (conductive near elastomer\$3)  | USPAT                                     | OR               | OFF     | 2007/09/21 12:57 |
| S3    | 7    | roughness with (conductive near elastomer\$3)  | USPAT                                     | OR               | OFF     | 2007/09/21 13:01 |
| S4    | 2    | S2 not S3  | USPAT                                     | OR               | OFF     | 2007/09/21 13:01 |
| S5    | 9    | S1 and "324"/\$.ccls.  | USPAT                                     | OR               | OFF     | 2007/09/21 13:30 |
| S6    | 18   | ("4820376"   "5618189"   "5810607"   "5991165"   "6052286"   "6081429"   "6168442"   "6270363"   "6332786").PN. OR ("6447308").<br>URPN.   | US-PGPUB;<br>USPAT;<br>USOCR              | OR               | OFF     | 2007/09/21 13:29 |
| S7    | 2    | S1 and "439"/\$.ccls.  | USPAT                                     | OR               | OFF     | 2007/09/21 13:30 |
| S8    | 14   | ("5213715"   "5259770"   "5317255"   "5431571"   "5474458"   "5502889"   "5576519"   "5688584"   "5800650"   "5818700"   "5975922"   "6270363"   "6447308"   "6663799").PN. OR ("7059874").<br>URPN. | US-PGPUB;<br>USPAT;<br>USOCR              | OR               | OFF     | 2007/09/21 13:32 |
| S9    | 31   | S6 or S8   | US-PGPUB;<br>USPAT;<br>USOCR              | OR               | OFF     | 2007/09/21 13:33 |
| S10   | 1    | S6 and S8  | US-PGPUB;<br>USPAT;<br>USOCR              | OR               | OFF     | 2007/09/21 13:32 |
| S11   | 9    | S9 and rough\$4  | US-PGPUB;<br>USPAT;<br>USOCR              | OR               | OFF     | 2007/09/21 13:35 |
| S12   | 11   | S9 and \$1mu\$1m   | US-PGPUB;<br>USPAT;<br>USOCR              | OR               | OFF     | 2007/09/21 13:47 |

## EAST Search History

|     |    |  |   |    |     |                  |
|-----|----|--|---|----|-----|------------------|
| S13 | 5  | roughness and (conductive near elastomer\$3)   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | OFF | 2007/09/21 14:29 |
| S14 | 1  | (anisotropically near2 (electroconductive or elastomer\$3)) with (rough\$4 near2 \$1mu\$1m)  | US-PGPUB;<br>USPAT;<br>USOCR              | OR | ON  | 2007/09/21 13:48 |
| S15 | 0  | (anisotropically near2 (electroconductive or elastomer\$3)) with (rough\$4 near2 \$1mu\$1m)  | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 13:48 |
| S16 | 1  | (anisotropic\$4 near2 (electroconductive or elastomer\$3)) with (rough\$4 near2 \$1mu\$1m)   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 13:56 |
| S17 | 39 | ("4209481"   "4292261"   "4408814"   "4500757"   "4571542"   "4833402"   "4838347"   "4863757"   "4927368"   "5033675"   "5109596").PN. OR ("5317255").URPN.   | US-PGPUB;<br>USPAT;<br>USOCR              | OR | OFF | 2007/09/21 13:49 |
| S18 | 1  | (anisotropic\$4 near2 (electroconductive or elastomer\$3)) same (rough\$4 near2 \$1mu\$1m)   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 13:57 |
| S19 | 1  | (anisotropic\$4 near2 (electroconductive or elastomer\$3)) same (rough\$4 near2 \$1mu\$1m)   | US-PGPUB;<br>USPAT;<br>USOCR              | OR | ON  | 2007/09/21 13:59 |
| S20 | 1  | (anisotropic\$4 near2 (electroconductive or elastomer\$3)). ti. and rough\$4   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 14:00 |
| S21 | 0  | (anisotropic\$4 near2 (electroconductive or elastomer\$3)). ti. and rough\$4 and \$1mu\$1m   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 13:58 |
| S22 | 5  | (anisotropic\$4 near2 (electroconductive or elastomer\$3)). ti. and rough\$4 and \$1mu\$1m   | US-PGPUB;<br>USPAT;<br>USOCR              | OR | ON  | 2007/09/21 14:30 |
| S23 | 17 | (US-5497033-\$ or US-5565968-\$ or US-6437551-\$ or US-4422035-\$ or US-6447308-\$ or US-7059874-\$ or US-6663799-\$ or US-5818700-\$ or US-6168442-\$ or US-5317255-\$ or US-5109596-\$ or US-4571542-\$). did. or (EP-1720019-\$ or WO-2005080996-\$).did. or (JP-2005241291-\$ or JP-2004037785-\$).did. or (WO-2005080996-\$).did. | USPAT;<br>EPO; JPO;<br>DERWENT            | OR | OFF | 2007/09/21 13:59 |

## EAST Search History

|     |    |   |   |    |     |                  |
|-----|----|---|---|----|-----|------------------|
| S24 | 2  | smoothness and (conductive near elastomer\$3)   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | OFF | 2007/09/21 14:29 |
| S25 | 41 | smoothness and (conductive near elastomer\$3)   | US-PGPUB;<br>USPAT;<br>USOCR              | OR | OFF | 2007/09/21 14:29 |
| S26 | 0  | smoothness near2 (conductive near elastomer\$3)   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | OFF | 2007/09/21 14:29 |
| S27 | 0  | smoothness with (conductive near elastomer\$3)  | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | OFF | 2007/09/21 14:29 |
| S28 | 4  | (anisotropic\$4 near2 (electroconductive or elastomer\$3)). ti. and smooth\$4 and \$1mu\$1m | US-PGPUB;<br>USPAT;<br>USOCR              | OR | ON  | 2007/09/21 14:34 |
| S29 | 1  | (anisotropic\$4 near2 (electroconductive or elastomer\$3)) and smooth\$4 and \$1mu\$1m      | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 14:39 |
| S30 | 4  | "2003077560"  | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 16:10 |
| S31 | 2  | "2000294043"  | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 14:44 |
| S32 | 0  | jp11111064a   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 14:47 |
| S33 | 0  | jp110111064a  | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 14:48 |
| S34 | 0  | jp110111064   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 14:48 |
| S35 | 2  | jp adj "11111064"   | FPRS;<br>EPO; JPO;<br>DERWENT;<br>IBM_TDB | OR | ON  | 2007/09/21 14:48 |

LAST Browser - L3: (7) roughness val... | US 7220796 | Tag: 5 | Doc: 1/7 | "Full" 1/30 (Total Images 30) | Front Page

File Edit View Tools Window Help

Courier New 12

L3: (7) roughness val... | US 7220796 | Tag: 5 | Doc: 1/7 | "Full" 1/30 (Total Images 30) | Front Page

L3: (7) roughness val... | US 7220796 B2 | Tag: 5 | Doc: 1/7 | Format: RTF

US-PAT-NO: 7220796  
DOCUMENT- US 7220796 B2  
IDENTIFIER:  
TITLE: Conductive elastomer composition, conductive member using conductive elastomer composition, image-forming apparatus having conductive member

(12) **United States Patent**  
Mizumoto et al.

(10) Patent No.: US 7,220,796 B2  
(45) Date of Patent: May 22, 2007

(54) CONDUCTIVE ELASTOMER COMPOSITION, CONDUCTIVE MEMBER USING CONDUCTIVE ELASTOMER COMPOSITION, IMAGE-FORMING APPARATUS HAVING CONDUCTIVE MEMBER

(75) Inventors: Yoshihito Mizumoto, Hyogo (JP); Takayuki Hattori, Hyogo (JP); Tetsuo Minaguchi, Hyogo (JP)

(73) Assignee: Sumitomo Rubber Industries, Ltd., Kobe-shi (JP)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 30 days.

(21) Appl. No.: 11/251,832  
(22) Filed: Oct. 18, 2005  
(65) Prior Publication Data  
US 2006-0074162 A1 Apr. 6, 2006

Related U.S. Application Data  
(52) Division of application No. 10/704,906, filed on Nov. 12, 2001, now Pat. No. 7,098,264.

(30) Foreign Application Priority Data  
Nov. 13, 2002 (JP) 2002-329922

(51) Int. Cl. B29B 1/06 (2006.01)  
(52) U.S. Cl. 524/405; 524/430; 524/401; 429/56  
(58) Field of Classification Search 524/493, 524/401, 430, 429/56  
See application file for complete search history.

(36) References Cited  
U.S. PATENT DOCUMENTS  
5,702,216 A \* 6/1998 Michnik et al. 428/423  
5,940,462 \* 8/1999 Nam et al. 320/175  
6,319,181 B1 \* 11/2001 Nam et al. 492/36  
6,444,325 B1 \* 9/2002 Marazoto et al. 428/447  
FOREIGN PATENT DOCUMENTS  
JP 2001-214030 \* 8/2001  
JP 2001-217009 \* 8/2001  
JP 2002-28714 \* 8/2002  
\* cited by examiner  
Primary Examiner—David W. Wu  
Assistant Examiner—Henry S. Hu  
(74) Attorney, Agent, or Firm—Birch, Stewart, Kolasch & Birch, LLP

(57) ABSTRACT  
A conductive elastomer composition includes an ionic-conductive elastomer component, which contains an anion-containing salt having a fluoro group (F—) and a siloxanyl group (—SiO<sub>2</sub>—). The conductive elastomer composition has a volume charge not more than 10<sup>-11</sup> (C/cm) when the volume charge is measured at a voltage of 100V applied therein accordance with the method specified in JIS K6511. The conductive elastomer composition has a compression set not more than 50% when the compression set is measured at a temperature of 70° C. for 24 hours at a compressibility ratio of 25% in accordance with "the permanent set testing methods for rubber, vulcanized or thermoplastic" specified in JIS K6262.

12 Claims, 8 Drawing Sheets

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